

REMARKS

Claims 1-30 are currently pending in the subject application and are presently under consideration. A current listing of the claims is shown at pp. 3-7 of the Reply. The Specification has been amended as indicated at p. 2 of the Reply.

Favorable reconsideration of the subject patent application is respectfully requested in view of the comments and amendments herein.

I. Rejection of Claims 1-8, 10-15 and 18-30 Under 35 U.S.C. §103(a)

Claims 1-8, 10-15 and 18-30 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Reinhardt *et al.* (US Patent 5,541,607) in view of Hong *et al.* (US Patent 6,281,838). Withdrawal of this rejection is respectfully requested for at least the following reasons. Reinhardt *et al.* and Hong *et al.*, either alone or in combination, fail to teach or suggest each and every limitation set forth in the subject claims.

To reject claims in an application under §103, an examiner must establish a *prima facie* case of obviousness. A *prima facie* case of obviousness is established by a showing of three basic criteria. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) **must teach or suggest all the claim limitations.** See MPEP §706.02(j). The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art and not based on applicant's disclosure. See *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991) (emphasis added).

Applicants' claimed invention relates generally to systems and methods that facilitate signal modulation, and in particular to a positive-intrinsic-negative (PIN) diode switch based delay line quadra-phase shift key (QPSK) modulator based on microwave monolithic integrated circuit (MMIC) technology. PIN diodes are used as the switching devices to send Radio Frequency (RF) signals through various lengths of transmission lines. For example, the PIN diode can switch a signal between a short and a long length of transmission line to develop a phase associated with a transmission line propagation constant that is based on a differential

transmission line length. (*See Specification, paragraph 0039*). Through the use of MMIC technology these phase shifters can be consistently fabricated on a single chip for extremely high frequency operation. Furthermore, utilizing MMIC technology to create a PIN Diode switch based delay line QPSK modulator can reduce footprint and assembly cost, and increase performance *via* mitigating parasitic reactance. The systems and methods, for example, can be employed in connection with antenna signal auto tracking, and provide for reduced phase shifting assembly size, cost and complexity, consistent fabrication, and improved performance. In particular, independent claim 1 (and similarly independent claims 18, 24, and 30) recites a signal processing system, comprising: *a component that receives an antenna pointing signal; and a monolithic shift key (SK) modulation component, incorporating at least one positive-intrinsic-negative (PIN) diode, the PIN diode switch the signal through a plurality of phase shifting paths to introduce a plurality of phase shifts to the signal based on one of number or combination of the plurality of phase shifting paths.* Reinhardt *et al.* does not disclose or suggest each and every limitation set forth in the subject claims. More specifically, Reinhardt *et al.* fails to disclose or suggest a *monolithic shift key (SK) modulation component, incorporating at least one positive-intrinsic-negative (PIN) diode*.

Reinhardt *et al.* discloses a system and method for polar digital beamforming where complex weighing signals can be generated by summing a sequence of complex multiplications or by simply inverting the real and imaginary components of the weighting signal for particular modulation schemes. Reinhardt *et al.* teaches a multiple-beam phased array antenna which digitally generates pointing and modulation information, and utilizes a simple polar architecture to implement polar digital beamforming. Reinhardt *et al.*, further teaches utilizing phasors, attenuators, and previously developed digital Application Specific Integrated Circuits (ASICs) to implement polar digital beamforming. (*See, column 2, lines 52-67*). In the Final Office Action (dated May 17, 2007), the Examiner argues that Reinhardt *et al.* teaches a monolithic shift key modulation component (“ASIC Col 2, L65-67; Col 6, L25-60”). Applicants’ representative respectfully disagrees. At the indicated passages, Reinhardt *et al.* merely teaches the use of *previously developed* phasors, attenuators, Application Specific Integrated Circuits (ASICs) and fails to teach or suggest utilizing *MMIC technology to create a PIN Diode switch based delay line QPSK modulator on a single chip*. It should be noted that a mere reference to the use of previously developed Integrated Circuits (e.g. ASIC) in a particular system does not suggest the

development and/or construction of the system using that particular technology (e.g. MMIC technology). For example, as shown in Fig. 3, the Specification teaches the use of phase shifting components, which can include PIN diode switched delay lines, to generate a four phase states for QPSK modulation. The Specification further states that MMIC technology can be employed to construct the phase shifting components and the QPSK modulator. (See Specification, paragraph 0050). Reinhardt *et al.* is silent about such use of MMIC technology for the construction and/or development of the shift key modulator. Hence, Reinhardt *et al.* fails to disclose or suggest a **monolithic shift key (SK) modulation component, incorporating at least one positive-intrinsic-negative (PIN) diode.** Furthermore, Reinhardt *et al.* is silent about ***PIN diodes that switch signals through a plurality of phase shifting paths to introduce a plurality of phase shifts*** as recited in the subject independent claims. In the Final Office Action (dated May 17, 2007), the Examiner relies upon Hong *et al.* to cure the deficiency Reinhardt *et al.* with respect to ***PIN diodes that switch signals through a plurality of phase shifting paths to introduce a plurality of phase shifts.*** However, Hong *et al.* fails to make up for the aforementioned deficiency of Reinhardt *et al.*, with respect to **monolithic shift key (SK) modulation component.** More specifically, Hong *et al.* fails to disclose or suggest a system that utilizes **MMIC technology to create a PIN diode switch based delay line QPSK modulator.**

In view of at least the foregoing, it is readily apparent that Reinhardt *et al.* and Hong *et al.*, alone or in combination, do not teach or suggest the subject invention as recited in independent claims 1, 18, 24 and 30 (and claims 2-8, 10-15, 19-23, and 25-29 which depend therefrom). Accordingly, this rejection should be withdrawn.

II. **Rejection of Claim 9 Under 35 U.S.C. §103(a)**

Claim 9 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Reinhardt *et al.*(US Patent 5,541,607) in view of Hong *et al.* (US Patent 6,281,838) further in view of Taft *et al.* (US Patent 7,030,824). It is respectfully submitted that this rejection should be withdrawn for at least the following reasons. Reinhardt *et al.*, Hong *et al.* and Taft *et al.*, individually or in combination, do not teach or suggest each and every element set forth in the subject claim. In particular, Taft *et al.* does not make up for the aforementioned deficiencies of Reinhardt *et al.* and Hong *et al.* with respect to independent claim 1 (which claim 9 depends from). Therefore,

the claimed invention as recited in claim 9 is not obvious over the combination of Reinhardt *et al.*, Hong *et al.* and Taft *et al.* Thus, it is respectfully submitted that this rejection be withdrawn.

III. Rejection of Claim 16 Under 35 U.S.C. §103(a)

Claim 16 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Reinhardt (US Patent 5,541,607) in view of Hong *et al.* (US Patent 6,281,838) further in view of Mano *et al.* (US Patent 6,778,586). It is respectfully submitted that this rejection should be withdrawn for at least the following reasons. Reinhardt *et al.*, Hong *et al.* and Mano *et al.*, individually or in combination, do not teach or suggest each and every element set forth in the subject claim. In particular, Mano *et al.* does not make up for the aforementioned deficiencies of Reinhardt *et al.* and Hong *et al.* with respect to independent claim 1 (which claim 16 depends from). Therefore, the claimed invention as recited in claim 16 is not obvious over the combination of Reinhardt *et al.*, Hong *et al.* and Mano *et al.* Thus, it is respectfully submitted that this rejection be withdrawn.

IV. Rejection of Claim 17 Under 35 U.S.C. §103(a)

Claim 17 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Reinhardt *et al.* (US Patent 5,541,607) in view of Hong *et al.* (US Patent 6,281,838) further in view of Stiles *et al.* (US Patent 3,768,050). It is respectfully submitted that this rejection should be withdrawn for at least the following reasons. Reinhardt *et al.*, Hong *et al.* and Stiles *et al.*, individually or in combination, do not teach or suggest each and every element set forth in the subject claim. In particular, Stiles *et al.* does not make up for the aforementioned deficiencies of Reinhardt *et al.* and Hong *et al.* with respect to independent claim 1 (which claim 17 depends from). Therefore, the claimed invention as recited in claim 17 is not obvious over the combination of Reinhardt *et al.*, Hong *et al.* and Stiles *et al.* Thus, it is respectfully submitted that this rejection be withdrawn.

CONCLUSION

The subject application is believed to be in condition for allowance in view of the above comments and amendments. A prompt action to such end is earnestly solicited.

In the event any fees are due in connection with this document, the Commissioner is authorized to charge those fees to Deposit Account No. 50-1063 [TRWP122US].

Should the Examiner believe a telephone interview would be helpful to expedite favorable prosecution, the Examiner is invited to contact applicants' undersigned representative at the telephone number below.

Respectfully submitted,

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